

APPENDIX E. Stormwater basins and ponds

Additional requirements may be applied on a site-specific basis.

(1) Basin and pond types. A variety of stormwater management basins and ponds are used to control runoff quantity and improve runoff quality from developments. All need professional siting and design to avoid unreasonable impacts to wetlands, surface waters, and groundwater and to ensure long-term stability, pollutant removal performance, and control of peak flow rates. Specific siting and design criteria for each type of structure can be found in the department's manual *Stormwater Management for Maine: Best Management Practices*. General restrictions and requirements for all basins and ponds are provided below.

(2) Siting restrictions. The department has placed the following restrictions on the siting of stormwater basins and ponds. Other restrictions may apply based on drainage, geotechnical, wildlife, and safety concerns.

(A) Rivers, streams and brooks. A basin or pond may not be located within or adjacent a river, stream, or brook (intermittent or perennial) unless approved by the department pursuant to, or exempted from, the Natural Resources Protection Act.

(B) Wetlands. A basin or pond may not be constructed within or adjacent to a wetland and no dam, wall, berm, or embankment may be placed within or adjacent a wetland as part of a stormwater management system unless approved by the department pursuant to, or exempted from, the Natural Resources Protection Act. The use of natural wetlands for runoff detention or retention storage in order to meet the flooding standard or water quality standards is prohibited unless the quantity standards in Section 5(B)(8)(page 8), Discharge to freshwater or coastal wetlands, are met and a Natural Resources Protection Act permit is obtained if required.

(c) Discharge of flows. Concentrated flows from stormwater basins and ponds may not be discharged to an off-site area that has not received concentrated flows before. When detention is used on a site, the pre-construction flow condition to off-site areas, whether sheet or concentrated, must be maintained in the post-construction condition unless drainage easements are obtained from affected property owners.

(d) Underground detention. Where underground detention is necessary due to limited space or other restrictions, runoff must be treated to remove at least 50% of the total suspended solids prior to the runoff's discharge to the underground storage facility. The department may require runoff treatment to remove other pollutants if it determines that underground storage poses a threat to groundwater quality. The outlet control structure and storage chambers for the underground detention structure must be accessible from the surface for maintenance, debris removal, and, if necessary, future modification.

(3) Design requirements

(a) Primary outlet structures. Those basins and ponds designed to control flows so to meet the flooding standard must have outlets capable of controlling runoff from 24-hour storms of 2-year, 10-year, and 25-year frequencies. Those basins and ponds designed to provide channel protection detention must have outlets capable of providing extended detention of twelve hours for runoff from a 24-hour storm with a 1-year frequency. Extended detention shall mean the average detention time of runoff entering the pond using the plug-flow method is twelve hours. Basin and pond outlets must have the design features listed below.

- (i) Trash racks.** All pipes, culverts, and orifices must have trash racks to control clogging by debris and to provide safety to the public. The surface area of the rack must be at least four times the outlet opening area. Larger rack areas may be required for smaller orifices. The spacing between rack bars must be four inches or one-half the smallest dimension of the outlet opening, whichever is smaller. If possible, racks should be inclined so to be self-cleaning.
- (ii) Seepage controls.** All smooth outlet pipes greater than eight inches and all corrugated outlet pipes greater than 12 inches must have seepage controls to prevent the piping of soil along the outside of the pipe. This standard applies to both dry detention basins and ponds with permanent pools.
- (iii) Anti-floatation design.** All outlet employing a riser structure must be designed to prevent the riser floating during the detention or retention runoff.
- (b) Emergency spillways.** Each stormwater basin and pond must have an emergency spillway designed to independently convey the routed runoff from a 25-year, 24-hour storm while maintaining at least one foot of freeboard between the peak storage elevation and the top of the embankment crest. All spillways must meet the following criteria.

 - (i) Location.** Emergency spillways must be located on undisturbed, non-fill soil wherever possible. If the spillway must be located on fill soils, then the spillway must be horizontally offset at least 20 feet from the principal outlet and be designed with a riprap lining, reinforced-turf lining, or a non-flexible lining.
 - (ii) Exit channel grade.** The maximum grade of the spillway's exit channel must not exceed 20% unless a non-flexible lining is used to control erosion within the channel. Vegetation, reinforced turf, riprap, and modular blocks are considered flexible linings. All linings must be evaluated for stability at the channel grade chosen.
 - (iii) Flow depth.** The design flow depth in the exit channel may not exceed one-half the d50 stone size for channels lined with riprap. The design flow depth in the exit channel may not exceed three inches for channels lined with un-reinforced vegetation.
- (c) Embankments.** Basin and pond embankments must be designed by a professional engineer. The design must include a geotechnical investigation of the subsurface conditions at the proposed embankment location to evaluate the need for seepage controls, to design for the effects of settlement, and to consider the effects of groundwater.

 - (i) Crest Elevation.** The minimum elevation of the top of the settled embankment must be at least one foot above the peak water surface in the basin with the emergency spillway flowing at design depth for a 25-year, 24-hour storm.
 - (ii) Construction.** All embankment fills must be compacted to at least 90% of the maximum density as determined by standard proctor (ASTM D-698).
 - (iii) Slopes.** The embankment's slopes may not be steeper than 3 horizontal to one vertical.
[Comments related to this standard being discussed by staff]

(d) Underdrain outlets. Those basins and ponds designed to provide channel protection filtering must have underdrains meeting the following criteria.

(i) Location and layout. *[to be developed]*

(ii) Pipe material. *[to be developed]*

(iii) Pipe installation. *[to be developed]*

(iv) Filter media. *[to be developed]*

(v) Vegetation. *[to be developed]*